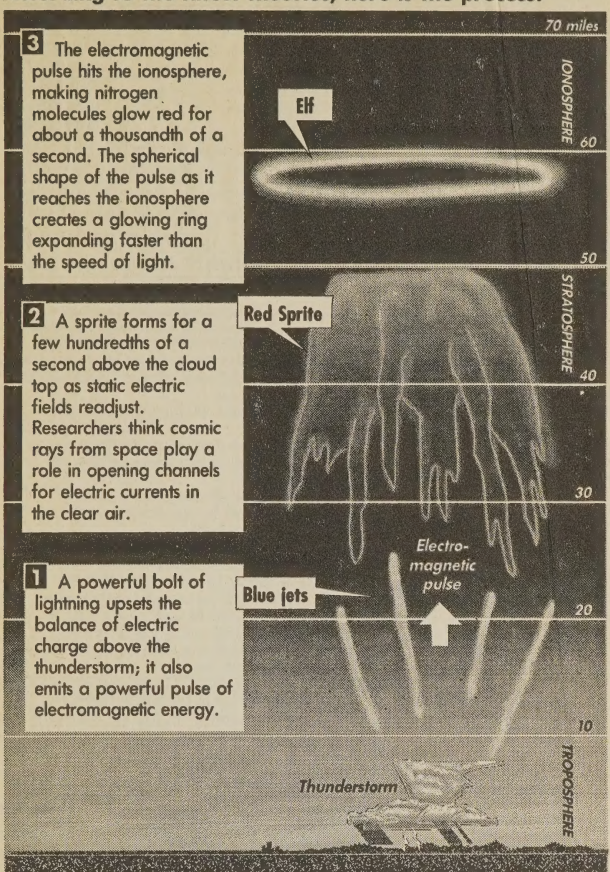
FT 8000R SCHEMATIC
HEATH HW 202 PL MODIFACTION
ICM XTAL INFO
MFJ RECEIPTS
MISC INFO

Columbian® - 90 Clasp (9 x 12)

ELVES AND SPRITES ABOVE THE CLOUDS

Researchers using a special camera say flickering lights high above thunderstorms include elves – glowing rings that expand faster than the speed of light, and sit on even larger blobs of glowing air called sprites.

According to the latest theories, here is the process:


70 miles
3 The electromagnetic pulse hits the ionosphere, making nitrogen molecules glow red for about a thousandth of a second. The spherical shape of the pulse as it reaches the ionosphere creates a glowing ring expanding faster than the speed of light.
Elf
IONOSPHERE
60
50
2 A sprite forms for a few hundredths of a second above the cloud top as static electric fields readjust. Researchers think cosmic rays from space play a role in opening channels for electric currents in the clear air.
Red Sprite
STRATOSPHERE
40
30
1 A powerful bolt of lightning upsets the balance of electric charge above the thunderstorm; it also emits a powerful pulse of electromagnetic energy.
Electro-magnetic pulse
Blue jets
20
10
Thunderstorm
TROPOSPHERE

Source: Umran Inan, Stanford University

BY JOHN BLANCHARD/ THE CHRONICLE

New Theory Explains Celestial Fireworks

Reflected rings move faster than light

By Charles Petit
Chronicle Science Writer

Flashing phenomena near the edge of space, called elves, are actually luminous rings expanding outward faster than the speed of light, Stanford scientists reported yesterday.

The elves sit briefly like haloes atop towering, blobby, glowing objects called sprites.

The ionosphere is a region of electrically charged particles high in the atmosphere where solar and cosmic rays knock electrons loose from atoms. The sudden impact of the energy pulse kicks the electrons and slams them into nitrogen ions, making them briefly glow red.

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With fanciful names suggestive of dancing magical beings in folk tales, elves and sprites are newly discovered natural electrical effects in the high atmosphere. They and related effects called blue jets occur above intense thunderstorms. They can put on spectacular light shows but are seldom seen in their full glory without special instruments. Storm clouds usually hide them from view of people on the ground.

Startling Sights

Sprites, elves and blue jets are startling sights. For years, airline pilots and other high-altitude fliers reported glimpses of strange goings-on in the clear air over nighttime thunderstorms. Now, researchers think they are important clues to energy flows between the ionosphere and the ionosphere of electrically charged particles where the air fades into the near vacuum of space.

Scientists confirmed the existence of sprites and blue jets about seven years ago; elves were discovered only about two years ago. The phenomena were subjects of a series of sessions yesterday and continuing today at the annual meeting of the American Geophysical Union in San Francisco.

The elves, and their ability to produce visual patterns that move faster than the speed of light, were described in detail by Umran Inan, professor of electrical engineering at Stanford University.

While the reflected ring in the ionosphere spreads outward faster than the speed of light — growing from a point to a circle more than 150 miles wide in a tiny fraction of a second — Inan emphasized that no material particles or light waves actually go faster than light. To do so would violate the limit imposed by known laws of physics.

What expands is the region where an upward-expanding, bubble-like electromagnetic pulse, racing outward from a powerful bolt of lightning nearer the ground, intersects the nearly flat bottom of the ionosphere.

'Like a Beach'

"It is like a beach where the waves come in at a slight angle," Inan said. "The wave may be going slowly, but the place where it breaks on the beach may move very fast."

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Inan's team built a special camera they call a "fly's eye" to get images of the fast-growing rings of light. The pictures were taken from the ground, at Fort Collins, Colo., looking across the Great Plains toward thunderstorms 150 miles away.

Elves had been detected before, but by cameras too insensitive to measure a pattern that moves across the sky so quickly and vanishes within one-thousandth of a second.

Detection of the fast-growing ring seems to confirm the Stanford scientists' theory that elves are in fact caused by an upward pulse of electromagnetic energy.

The fly's eye camera has 12 separate lenses, and looks like a cluster of gun barrels each aimed at a slightly different place in the sky. By comparing the pictures from each lens, and correcting for how far away each signal was and how long it would take to reach the camera, the scientists were able to reconstruct the expansion of the short-lived rings of light.

Riding the Sprites

"Typically, these elves are sitting on top of the sprites. The elf is like a crown," said Inan.

The entire sequence of events that produces elves, sprites and bolts of light called blue jets that erupt upward from the tops of thunderheads is not fully sketched out by scientists.

But another research team from Los Alamos National Laboratory in New Mexico said an "electron runaway" theory seems to explain them well. Atmospheric physicist Yuri Taranenko, a former student of Inan's at Stanford, said large bolts of lightning not only discharge energy from clouds to the ground, but upset the balance of electric charges between the thunderhead and the atmosphere above it.

Those forces come abruptly back into balance, according to the Los Alamos theory, when cosmic rays constantly pouring down from space open electric circuits in the atmosphere.

Taranenko called the result "an electron avalanche." Red sprites and blue jets appear in the middle atmosphere, where electric charges change abruptly. Elves appear at almost the same time but higher, where — as the Stanford group described — electromagnetic pulses from the lightning or possibly sprites hit the ionosphere.

Herb Caen will be writing from time to time.

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INTERNATIONAL CRYSTAL MFG.

10 North Lee, Oklahoma City, OK. 73102

ORDER FORM

Customer Name

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				CH* XT			
				CH* XT			
				CH* XT			
				CH* XT			

*SEE REVERSE SIDE FOR NOTES

Total Number Items This Order

*CH OR XT SEE NOTE 3

Tax If Applicable

Total Remittance This Order

Monday, December 16, 1996

POST

HOW TO REACH US

By Telephone:	...7:00 a.m. to 6:00 p.m. Monday through Friday
San Francisco local	(415) 777-7777
San Francisco Bay Area (toll free)	(800) 354-7777
California (toll free)	(800) 499-5500
Outside California (toll free)	(800) 227-4423
By Visiting:	...100 Fifth Street at Mission, San Francisco CA, 94103 8:30 a.m. to 4:30 p.m. Monday through Friday
By Mail:	...Mail to San Francisco Newspaper Agency, Classified Depart. 925 Mission Street, San Francisco CA 94103
By Fax:	(415) 512-7303 • 543-4866
Customer Service:	(415) 777-6750/6:00 a.m. to 4:30p.m.
Home delivery:	(415) 777-7000

HOW TO ADVERTISE EFFECTIVELY AND ECONOMICALLY

Our telephone sales Representatives are pleased to help you compose the most effective ad at minimum cost. Here are some key points to remember about writing an ad:

1. Attract the reader's attention with your headline or opening statement.
2. Include all essential facts about your product, especially the price. Usually the ad with the most complete description will draw the best response.
3. Keep abbreviations to a minimum and use only commonly-understood abbreviations. Too many abbreviations may cause the ad to be unclear to the reader.
4. Classified advertising reaches more people than any other in Northern California, but not every potential buyer will read your ad on the same day. Take advantage of our multiple insertion rate discounts for ads running 4, 7 or 30 consecutive days. If your ad gets the results you want before the ad runs out, you can cancel it, you will then only be billed for the days your ad ran, based on the daily selling rate (this does not apply to "Super Saver" rates).

YOUR AD ON IS ON THE INTERNET!

Our Classified ads(except display ads) appear on the World Wide Web at no extra charge. Check out The Gate" at http://www.sfgate.com.

The Gate" is a service of the San Francisco Chronicle and the San Francisco Examiner.

MasterCard | VISA

ADVERTISING DEADLINES

For New Ads, Cancellations, Changes

These times apply to all single & option-6 ads. Holiday deadlines are especially different.

DAY AD STARTS — PHONE DEADLINE

Tuesday thru Saturday	3:30p.m. previous day
Sunday	11:30 a.m. Friday
Monday	4:30 p.m. Friday
Tuesday	5:30 p.m. Friday

FAX Deadlines 2:30 p.m. the day before
2:30 p.m. Thursday for Saturday
2:30 p.m. Friday for Sunday
4:30 p.m. Friday for Monday

This information will not be responsible for more than one incorrect insertion, and no liability shall be created by the giving of one insertion. No allowance will be made for errors not materially affecting the value of the ad. All error claims must be submitted within 30 days.

Ads cancelled before publication are for Non-Refund.

Any typesetting or insertion errors at the time of cancellation must be presented for verification if credit is desired. After an ad is stopped, it may not be cancelled or changed prior to the first insertion. 12:00

Prepayment Required

PUBLICATION.

Items being sold in ad. Four (4) ads of the same category of product are permitted at "Super Saver" restrictions apply, ask sales rep for details.

202 APARTMENTS SAN FRANCISCO UNFURNISHED

$850/$900 Newly remod 1BR Hardwood flrs, No Pets/Smkg 647-6637

$857 +sp tax stus & 1brs all amnts incl, cable, micro, 1 sty, w/d in unit. BMR rec, apply. 921-1969

$869-$1,100 Call 777-7777

CITY VIEWS!

1BR, renov, hrdwrflrs, private balcony, w/d, security bldg, gar, pets conditional. Call 626-5155

...rm, quiet, top flrs/shops, vu, ...ndry, no pets. 563-1188

$895 1BR/Bus Hill Newly remodeled, hrdwd flrs, new appls, no pets. 621-2424 x605

$895 Super studio. Fulton/20th Ave. h/t/wtr. Nice pant. 561-4519

$975 975 elegant view, Jr 1BR, 1BR. Closets. Lndry. 777-1794

$885 & UP CATS OK

FOX PLAZA

SPECTACULAR VIEWS

Studio,1 & 2BR

* Fireplaces
* Wall-to-Wall Carpets*
* Restaurant & Deli
* Health Club Center
* Fitness Center
* Secured Parking Avail
* BART/Muni at your door
* 24Hr Lobby Attendant
* Cable Ready
* Dry Cleaner
* Pool Deck

415-626-6902

Subject to Change

SUBJ 8.5 up Richmond & Sunset 1, 2BRs. W/D, pets. 668-2580

$998 STUDIO/RUSSIAN HILL ...ONTEMPORARY 552-9595 Fee

$995 Studio & 1Bdrm, Jr 1Bdrm, Sr 1Bdrm, Lrge 1Bdrm, Sr 2Bdrm, Lrge 2Bdrm, Sr 2Bdrm, Lrge 2Bdrm, Sr 3Bdrm, Lrge 3Bdrm, Sr 3Bdrm, Lrge 3Bdrm, Sr 4Bdrm, Lrge 4Bdrm, Sr 4Bdrm, Lrge 4Bdrm, Sr 5Bdrm, Lrge 5Bdrm, Sr 5Bdrm, Lrge 5Bdrm, Sr 6Bdrm, Lrge

INTERNATIONAL CRYSTAL MFG.

10 North Lee, Oklahoma City, OK. 73102

ORDER FORM

Customer Name

File Number

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				CH* XT			
				CH* XT			
				CH* XT			
				CH* XT			

*SEE REVERSE SIDE FOR NOTES

Total Number Items This Order

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Tax If Applicable

Total Remittance This Order

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Catalog numbers normally have six digits. Special numbers may have seven digits, and/or characters.

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REMARKS

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All claims for defective workmanship or material must be made in writing within 10 days after receipt at specified point of delivery. Any claims made after this time will not be recognized. Returned material will not be accepted unless we previously authorize return of same in writing.

Dear International Custome

Thank you for your order. Attached is a copy of the processed order as it is being entered for production. Please check the information and notify us of any discrepancy. To insure proper credit and prevent any delay in the shipment of your order, please return the acknowledgment copy or refer to your factory order number with your remittance.

IMPORTANT

On inquiries on the status of your order, please refer to your Customer File Number and to the Factory Order Number given on the acknowledgment copy. Without these numbers it will be impossible for us to furnish information on your order.

INTERNATIONAL CRYSTAL MANUFACTURING COMPANY, INC.
10 North Lee, Oklahoma City, Oklahoma 73102

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Without these numbers it will be impossible for us to furnish information on your order.

For fast processing of your orders, include your file number

67358

YOUR NUMBER

Your name and current address are stored in this file as well as information on your working orders.

For fast processing of your orders, include your file number

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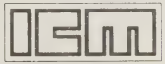
Your name and current address are stored in this file as well as information on your working orders.



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INTERNATIONAL CRYSTAL MANUFACTURING COMPANY, INC.
10 North Lee, Oklahoma City, Oklahoma 73102

INVOICE

Am-Com Inc.

100 Bierney Creek Road, Suite C, Lakeside, MT 59922
406-844-3052; email: sales@amcominc.com
www.amcominc.com

No.

INVOICE DATE 10-20-01

CUSTOMER'S ORDER NO.

SOLD TO: JIM SADLER W6SFW

SHIP TO: cash

SALESPERSON	SHIPPED VIA	TERMS	F.O.B.

QTY. ORDERED	QTY. SHIPPED	DESCRIPTION	UNIT	AMOUNT
		MFJ 873 VHF/UHF meter	1	114 95
			TH	9 19
		TOTAL		124 14

INTERNATIONAL CRYSTAL MANUFACTURING COMPANY, INCORPORATED

PO Box 26330, ~~10 North Lee,~~ Oklahoma City OK 73126-0330

INTERNATIONAL CRYSTAL MFG.

10 North Lee, Oklahoma City, OK. 73102

ORDER FORM

Customer Name: Jim Sadler

File Number: 67358

Item No.	QUANTITY	CATALOG NUMBER (Note 1)	CHANNEL/CRYSTAL FREQUENCY (Note 2) MHZ KHZ HZ		Equipment Type (See Note 4)	Unit Price	Total Price
1	1	47	127 100	CH* (XT)	KENWOOD TS 700SP		
2	1	220760	146 790	CH* (XT)	HEATHKIT HW 202	10.19	
				CH* XT			
				CH* XT			

*SEE REVERSE SIDE FOR NOTES

Total Number Items This Order

*CH OR XT SEE NOTE 3

Tax If Applicable

Total Remittance This Order

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NOTE 2
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Customer PO#

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				CH* XT			
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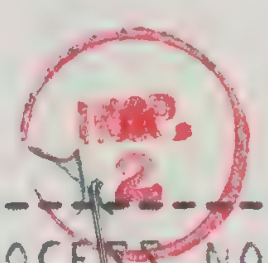
PACKING SLIP

CUSTOMER JIM SADLER

F/O N0031843 002 03/13/80

QNTY	CAT NO	CHAN FREQ	XTAL FREQ
1	433275		8.690000

CS 26C 32 PF



OVERTONE 1 PROCESS NO 01

--FINISH DEPT--

QNTY	XTAL FREQ	TOL	HLDR	LOAD	FCTR	CAL-T	ANGLE	PIN-PIN
1	8.690000	4A	1A	00	00	26	0.0	0.0
							0.0	0.0

CRAY-2

PACKING SLIP

CUSTOMER JIM SADLER

F/O N0031843 001 03/13/80

QNTY	CAT NO	CHAN FREQ	XTAL FREQ
1	433275		8.350000

CS 26C 32 PF

OVERTONE 1 PROCESS NO 01

--FINISH DEPT--

QNTY	XTAL FREQ	TOL	HLDR	LOAD	FCTR	CAL-T	ANGLE	PIN-PIN
1	8.350000	48	1A	00	00	26	0.0	0.0
							0.0	0.0

MAPCRAFTERS
INC.
P.O. BOX 1328
OKLAHOMA CITY, OKLA.
PHONE JEFF 6-1111

PACKING SLIP

CUSTOMER- JIM SADLER

F/O N0031843 003 03/13/80

QNTY	CAT NO	CHAN FREQ	XTAL FREQ
1	433275		8.720000

CS 26C 32 PF

OVERTONE 1 PROCESS NO 01

--FINISH DEPT--

QNTY	XTAL FREQ	TOL	HLDR	LOAD	FCTR	CAL-T	ANGLE	PIN-PIN
1	8.720000	4A	1A	00	00	26	0.0	0.0
							0.0	0.0

SJATYRG

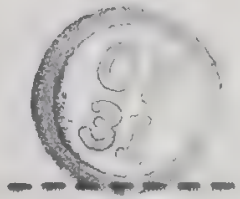
PACKING SLIP

CUSTOMER JIM SADLER

F/O N0031843 004 03/13/80

QNTY	CAT NO	CHAN FREQ	XTAL FREQ
1	433275		8.770000

CS 26C 32 PF



OVERTONE 1 PROCESS NO 01

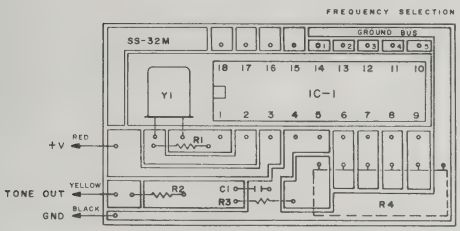
--FINISH DEPT--

QNTY	XTAL FREQ	TOL	HLDR	LOAD	FCTR	CAL-T	ANGLE	PIN-PIN
1	8.770000	4A	1A	00	00	26	0.0	0.0
							0.0	0.0

CRAY
LS

Heathkit 202 PL Modification

SS-32M INSTRUCTION SHEET



MOUNTING

Mount the unit with the items supplied. If the unit is mounted with silicon seal or any other type of glue, the warranty will be void unless all silicon seal or glue is confined to the bottom of the PCB around the edges only (none in IC-107).

POWER HOOK-UP

Hook +V (red) on the circuit board to a keyed source of +6 to +12VDC, regulated if possible. Hook GND (black) on the PCB to chassis ground in negative ground systems. If positive ground operation is required, interchange GND and +V connections. If polarity is reversed to the unit, IC-107 will be damaged. Be careful of a radio which has multiple grounds, such as a chassis ground and a true vehicle ground. A GE Mastr Pro is a good exampie. The same holds true of the Motorola HT-200/PT-200 series portables.

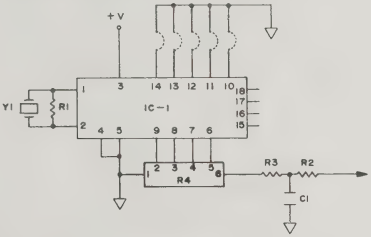
PROGRAMMING

This programmable line of products uses jumpers from the pins of IC-107 to the Ground Buss to select the frequency desired. When the jumpers are in any particular location, the binary code that is presented to IC-107 internally selects which one of the 32 frequencies is to be generated by the encoder. For instance, if 1Z (100.0Hz) is desired, the code required is located on the Programming Chart and the jumpers are added accordingly. For example, the code for 1Z is "01011", thus IC-107 pins 10 and 12 are grounded to the Ground Buss and pins 11, 13, and 14 left unconnected. Special frequencies are also avilable by using a different frequency crystal.

PROGRAMMING CHART FOR CTCSS PRODUCTS GROUP A

#	FREQ.	CODE	IC PIN NUMBER 10	11	12	13	14
1	67.0	XZ	0	0	0	0	0
2	71.9	XA	0	0	0	0	1
3	74.4	WA	0	0	0	1	1
4	77.0	XB	0	0	0	1	1
5	79.7	SP	0	0	1	0	0
6	82.5	YZ	0	0	1	0	1
7	85.4	YA	0	0	1	1	0
8	88.5	YB	0	0	1	1	1
9	91.5	ZZ	0	1	0	0	0
10	94.8	ZA	0	1	0	0	1
11	97.4	ZB	0	1	0	1	0
12	100.0	1Z	0	1	0	1	1
13	103.5	1A	0	1	1	0	0
14	107.2	1B	0	1	1	0	1
15	110.9	2Z	0	1	1	1	0
16	114.8	2A	0	1	1	1	1
17	118.8	2B	1	0	0	0	0
18	123.0	3Z	1	0	0	0	1
19	127.3	3A	1	0	0	1	0
20	131.8	3B	1	0	0	1	1
21	136.5	4Z	1	0	1	0	0
22	141.3	4A	1	0	1	0	1
23	146.2	4B	1	0	1	1	0
24	151.4	5Z	1	0	1	1	1
25	156.7	5A	1	1	0	0	0
26	162.2	5B	1	1	0	0	1
27	167.9	6Z	1	1	0	1	0
28	173.8	6A	1	1	0	1	1
29	179.9	6B	1	1	1	0	0
30	186.2	7Z	1	1	1	0	1
31	192.8	7A	1	1	1	1	0
32	203.5	M1	1	1	1	1	1

0 = SHORTED TO GROUND BUSS
1 = N/C



SS-32M PARTS LIST

R1	10Meg 1/8W Resistor 5% Carbon Film	06-1068	.22 ea
R2	6.8K 1/8W Resistor 5% Carbon Film	06-6828	.22 ea.
R3	1.2K 1/8W Resistor 5% Carbon Film	06-1228	.22 ea
R4	CSR202 Resistor Network	51-1217	2.30 ea
C1	.1uf Capacitor CY20 Mono	21-1040	2.00 ea
Y1	1MHz Crystal (2 Leads)	48-1000	7.50 ea
IC-1	Custom CMOS IC-107	51-0107	17.50 ea
1	Printed Circuit Board	84-1027	1.26 ea
10"	30 AWG PVC Black Wire	30-7025	.10 ft
10"	30 AWG PVC Red Wire	30-7026	.10 ft
10"	30 AWG PVC Yellow Wire	30-7028	.10 ft
2	Clear Mylar Label	54-1008	.05 ea
2	Group A Freq. Selection Stickers	54-1002	.10 ea
1	Square Double Sided Tape	75-1002	.05 ea

The price of the SS-32M is $29.95 each. Your PREPAID order will be sent POSTPAID by AIRMAIL or UPS Blue Label the same day it is received. California residents add 6% sales tax or supply resale card with order.

Communications Specialists, Inc.
426 W. Taft Ave., Orange, CA 92665-4296
(714) 998-3021 (California), (800) 854-0547

PROCEDURE FOR CONNECTING SUB-AUDIBLE ENCODER TONE TO TRANSMITTER

The encoder tone output is typically connected just prior to the modulator stage. Typical connections would be to the center of the deviation control, to the input of the final audio driver, to the varactor modulator diodes or to the manufacturer's normal connection point. This connection point varies with each different model radio, and you must determine which provides the best results. In a tube type transmitter, the grid of the modulator is often used, or a varactor kit should be used to modulate the crystal directly in a tube type or solid state transmitter, see figure E1. The VARACTOR (transistor base to collector junction of an NPN silicon transistor) changes A.C. voltage into changing capacitance which truely FM modulates the transmitter. No intermoding or distortion of the voice will be noted with this method. Various values of coupling capacitors are shown for different frequency ranges of the transmitter. A higher value of capacitance will increase the deviation level, however if the capacitance is too high, it may be difficult to set the transmitter on frequency. Varactor Kits are available from us for $3.00 each. Use this method if other connection points prove unsuccessful.

DO NOT connect the encoder tone to the microphone input as this invariably causes excessive tone and harmonic distortion due to the frequency response of the transmitter's speech amplifier. The speech amplifier has a typical response of 300Hz to 3000Hz and does not permit the fundamental tone to be transmitted. This is the usual cause of a distorted tone output as monitored on a deviation scope.

The output of our encoder is low Z, so it is capable of driving low Z loads. If you are driving a high Z load such as 100K deviation pot, then a series isolation resistor should be used so the encoder will not load down the normal voice modulation. This resistor value must be determined experimentally, but a 100K resistor would be a good starting point. This value could change from 10K to 1 meg depending on the radio used. If the tone output of the encoder is connected to a point in the transmitter where DC Bias is present, a .33uf to 1uf capacitor may have to be added in series with the encoder to keep this Bias from being upset.

If tone distortion continues to be a problem, then a capacitor can be placed on the tone output to provide additional filtering where required, see figure E2. This is most noticeable in phase modulators since the frequency response seems to be quite poor at the low end of the audio range. If you are using a deviation scope, then little spikes will be riding on the sine wave output, and this will sound like a buzz. The additional filtering will cure the problem. True FM modulators do not have this problem and are very easy to work with and interface very well with sub-audible encoders. These modulators can be identified quite easily since the audio is fed into a varactor which is often connected in parallel with the crystal. If the purity of the encoder output is in question, look at the output of the encoder with an oscilloscope.

Most UHF transmitters interface quite well with sub-audible encoders. This is primarily due to the high multiplication factor from the modulator to the final amplifier stage. Because of the lower number of multiplication stages in low band transmitters, sufficient deviation level can sometimes be difficult to obtain.

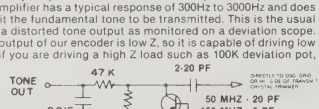


FIG. E1

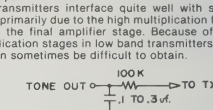


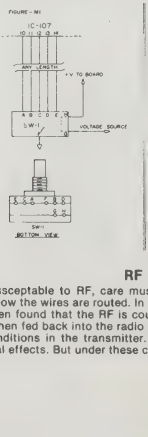
FIG. E2

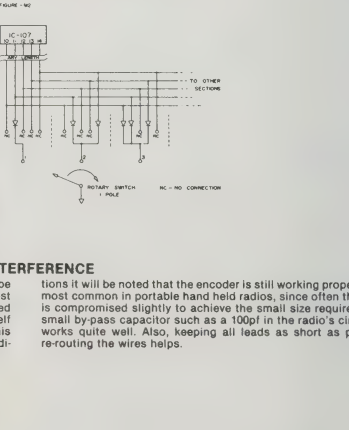
MULTI-TONE APPLICATIONS

By adding a little additional circuitry, our programmable line of products may be frequency programmed by remote means. Since these products all use DC signals for switching, any number of tones may be switched in or out without being concerned with additional lead length, or stray capacitance affecting the frequency. This is a typical problem associated with tunable or reed type units.

There are a number of ways of changing frequencies from a remote location. The easiest way is to use a 33 position binary switch (available from us) which connects on the circuit board. Thus all 32 tones may be accessed by rotating through all positions on the switch, with the first position on the switch being the off condition (see figure M1). When connections are made in this manner, position ONE will be the off condition, and the path from "G" to "H" will be open thereby removing power from the programmable board. Position TWO would be 67.0Hz (Group A), position THREE would be 71.9Hz, and so on up to position 33 which would be 203.5Hz.

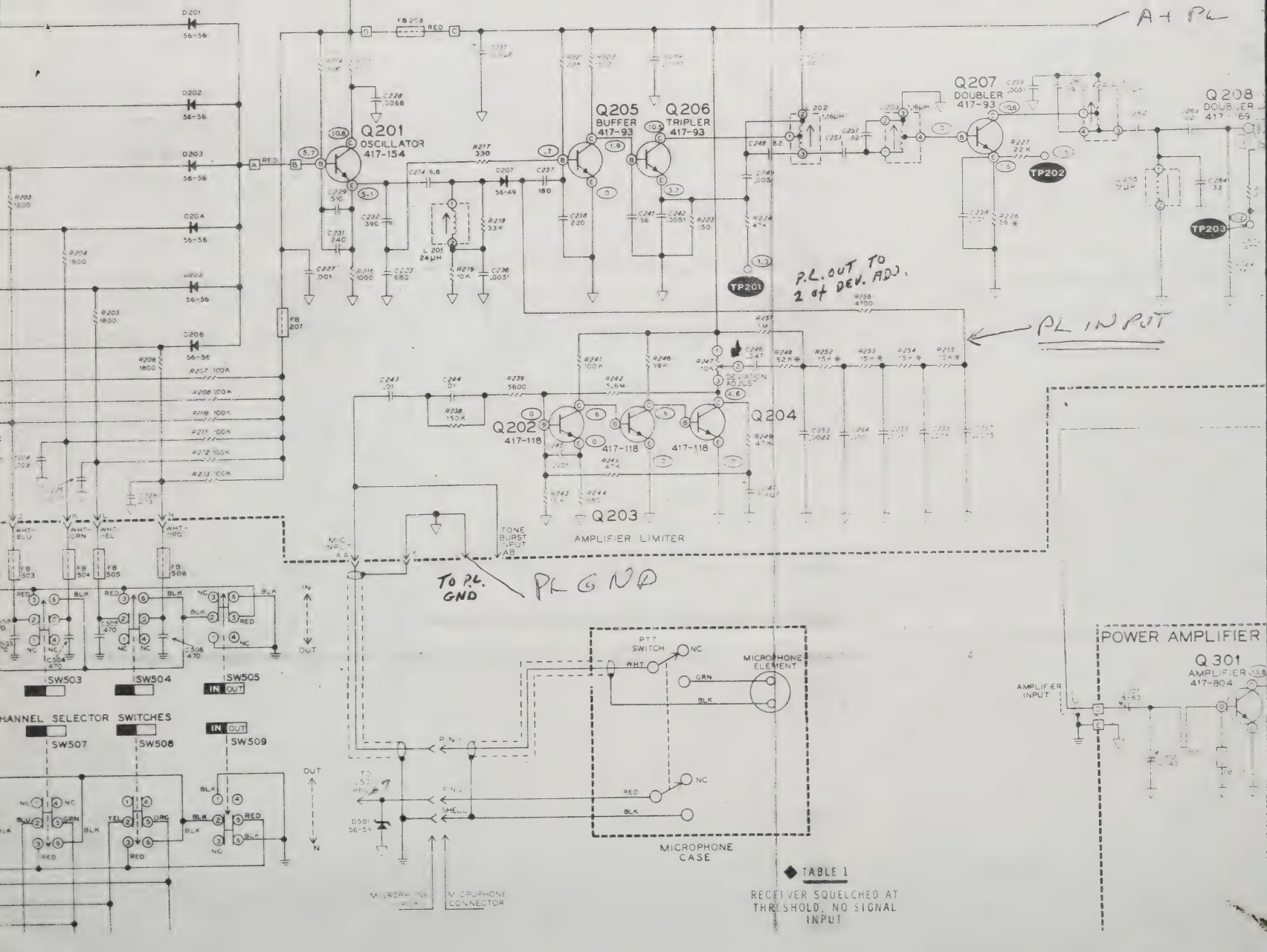
The other method for adding additional frequencies is to use a single pole rotary switch with as many positions as the number of different frequencies required. Using this method, a diode for line isolation must be used in each leg of the program code which requires a "0" or a ground for programming (see figure M2). In this example, three frequencies are required to operate a three site repeater system. The sub-audible tones required to access all three sites are 5Z (151.4Hz), 4B (146.2Hz), and YZ (82.5Hz). The frequency code is located on the programming chart for each of the three frequencies and these codes are converted to the appropriate diode array for each frequency. For example, position number two on the rotary switch must be 146.2Hz. This corresponds to "10110" on the program chart. By looking at this code, it is determined that 2 diodes will be required on the locations containing a "0", and no connection is required in the locations containing a "1". Thus the lines from pin 11, and pin 14, on IC-107 are pulled to ground through the series diodes when the rotary switch is in position number two. This method works quite well where space is a factor, and is best when only a few frequencies are required.





RF INTERFERENCE

Although our encoders are not susceptable to RF, care must be taken when locating the unit, and how the wires are routed. In most cases of RF interference it has been found that the RF is coupled into the leads of the encoder and then fed back into the radio itself where the RF upsets the bias conditions in the transmitter. This causes distortion and other unusual effects. But under these conditions it will be noted that the encoder is still working properly. This is most common in portable hand held radios, since often the circuitry is compromised slightly to achieve the small size required. Often a small by-pass capacitor such as a 100pf in the radio's circuit board works quite well. Also, keeping all leads as short as possible or re-routing the wires helps.



◆ TABLE 1

RECEIVER SQUELCHED AT THRESHOLD, NO SIGNAL INPUT

Dal —

Here is audio of HW-202 (Heathkit).

If you can find time, would you sketch in your recommendation for P.L. hookup.

Disregard my P.L. markings on dwg.

Tnx Jim

Have P.C. Oscillator — Where ↑ To connect ↑ is doubtful to me!
and how To existing ckt

JIM SADLER W6SFW
1323 39th AVENUE
SAN FRANCISCO, CA 94122

8125

SKYTEC

444 Crestview Drive
Ukiah, Calif. 95482
Phone: 462-6882

DATE Sept. 7 78

NAME A. J SADLER WB SFW

ADDRESS 1323 39th Ave. San Francisco, Ca.

SOLD BY	CASH	C.O.D.	CHARGE	ON ACCT.	MDSE. RETD.	PAID OUT
WB-DLG						94122

QUAN.		DESCRIPTION	PRICE	AMOUNT	
1	1	Cin-1 Spkr.		19	95
	2	#765			
	3				
	4	TAX		1	20
	5				
	6			21	15
	7	Paid			
	8				
	9	Thank you			
	10				
	11				
	12				

CUSTOMER'S ORDER NO. | REC'D BY

KEEP THIS SLIP FOR REFERENCE
5H 527 Redifprm

Temperature Compensation

Crystals requiring close temperature tolerance are supplied with curves to temperature vs frequency characteristics. Crystal angles are chosen so that the curve falls within compensation range of the oscillator (in which it is to be installed). To insure operation of the oscillator and crystal within tolerance over a wide temperature range, component values in the compensation network must be selected to correct the crystal curve. The curve of the new crystal may or may not match the curve of the crystal being replaced. After installation and tune-up, the customer should check the oscillator frequency over the temperature range the equipment will be operating. International has the facilities for making these oscillator temperature tests, and offers this service to customers at a nominal charge.

Installation

Care should be taken when installing crystals in your equipment. DO NOT overheat the base-to-can seal, or the vent hole seal. Attempting to solder at these points will damage the crystal.

Listed below are a few of the common problems encountered by customers during installation:

- Solder bridges between components.
- Defective oscillator components.
- Incorrect oscillator module type for equipment being used
- Low output (large frequency change requires retuning all stages following oscillator).
- Oscillator trim (where inductive trim is used, value of inductance must be changed with ranges — usually large frequency changes).
- Oscillator trim (some units use small variable for fine trim and large fixed capacitor for rough trim). Unit may require changing fixed capacitor.

WARRANTY

1. Crystals will be within tolerance and are guaranteed only to work in the equipment or oscillator load as shown on the calibration chart.
2. All International Crystals are guaranteed against defective materials and workmanship for an unlimited time when used in the correct equipment or oscillator load.
3. All crystals should be checked immediately upon receipt. Any damage must be reported to International Crystal within 10 days of receipt of order. The crystals should then be returned for inspection and replacement. Credit will not be allowed after this 10-day period for crystals damaged in the mails.
4. Crystals are custom made to your order and are not stock items. Units therefore may be returned only under the conditions specified in our return material policy.

INTERNATIONAL CRYSTAL MANUFACTURING COMPANY, INC.

10 North Lee, Oklahoma City, Oklahoma 73102

IMPORTANT

Please keep the individual item sheets and packing slip until the crystals have been checked for proper operation in your equipment.

If there are questions please return the item sheet and packing slip with the crystals since it gives the ICM Catalog number, Factory order number, etc., so that we may follow through with your questions. Without this information your order may be delayed.

Temperature Compensation

Crystals requiring close temperature tolerance are supplied with data as to temperature vs frequency characteristics. Crystal angles are chosen so that the curve falls within compensation range of the oscillator (in which it is to be installed). To insure operation of the oscillator and crystal within tolerance over a wide temperature range, component values in the compensation network must be selected to correct the crystal curve. The curve of the new crystal may or may not match the curve of the crystal being replaced. After installation and tune-up, the customer should check the oscillator frequency over the temperature range the equipment will be operating. International has the facilities for making these oscillator temperature tests, and offers this service to customers at a nominal charge.

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INTERNATIONAL CRYSTAL MFG.

10 North Lee, Oklahoma City, OK. 73102

PRIORITY ORDER FORM

Customer Name

File Number

Item No.	QUANTITY	CATALOG NUMBER (Note 1)	CHANNEL / CRYSTAL FREQUENCY (Note 2) MHZ KHZ HZ		Equipment Type (See Note 4)	Unit Price	Total Price
				CH* XT			
				CH* XT			
				CH* XT			
				CH* XT			

*SEE REVERSE SIDE FOR NOTES

Total Number Items This Order

*CH OR XT SEE NOTE 3

Tax If Applicable

Total Remittance This Order

NOTE 1
Catalog numbers normally have six digits. Special numbers may have seven digits, and/or characters.

NOTE 2
When using the ICM "40" series catalog number, you must specify CRYSTAL FREQUENCY. Catalog numbers assigned to specific equipment require CHANNEL FREQUENCY, since the file information contains the formula for calculating the crystal frequency. This would not apply to IF or special crystals.

NOTE 3
Circle letter CH for channel frequency.
Circle letter XT for crystal frequency.

NOTE 4

If you wish to have ICM check your catalog number, please list the type of equipment or equipment manufacturer's crystal number. Also, listing the crystal frequency you have determined will allow a cross check of catalog number and channel calculations. In cases where such information is not supplied, the crystal will be shipped for the catalog number and channel frequency specified.

Remember to include your FILE NUMBER

REMARKS

INTERNATIONAL CRYSTAL MANUFACTURING CO does not assume responsibility in collecting applicable state use taxes other than Oklahoma, and those states with which Oklahoma has a Reciprocal agreement. It is assumed that customers will declare and pay said use tax to their respective state.

All claims for defective workmanship or material must be made in writing within 10 days after receipt at specified point of delivery. Any claims made after this time will not be recognized. Returned material will not be accepted unless we previously authorize return of same in writing

FT-8000R
Circuit Diagram

NOTE 1
Catalog numbers normally have six digits. Special numbers may have seven digits, and/or characters.

NOTE 2
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Remember to include your FILE NUMBER

REMARKS

_____

_____

_____

_____

_____

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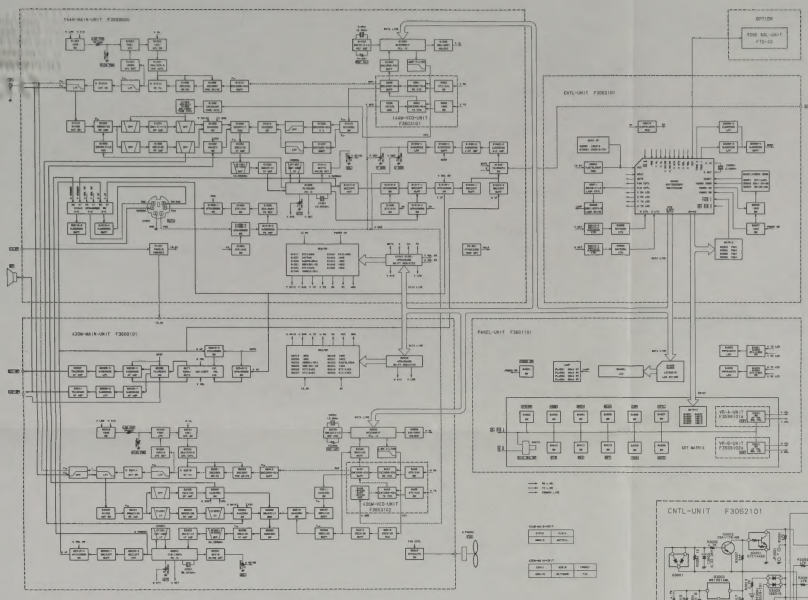
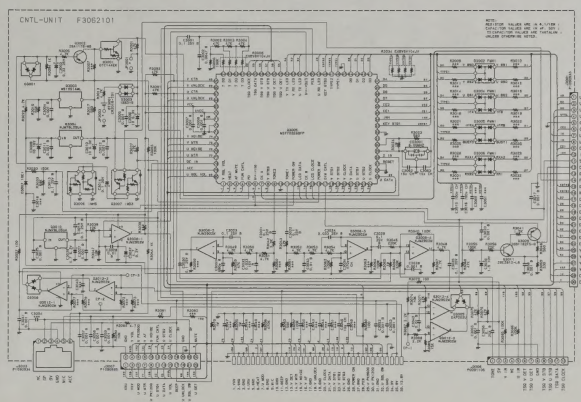
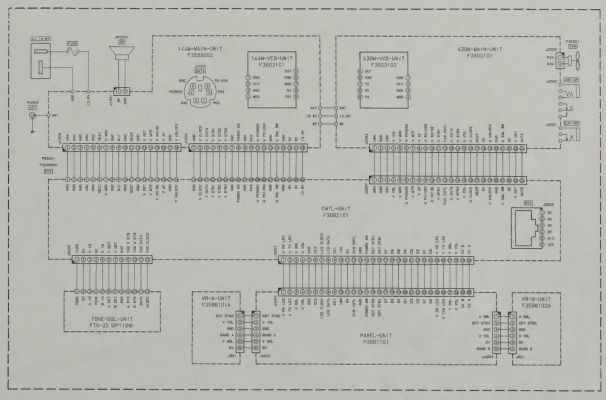
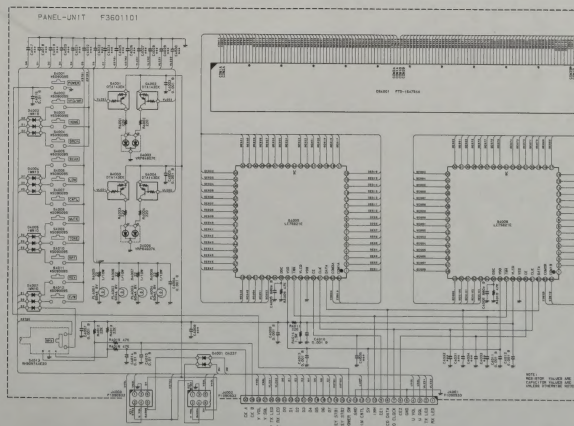
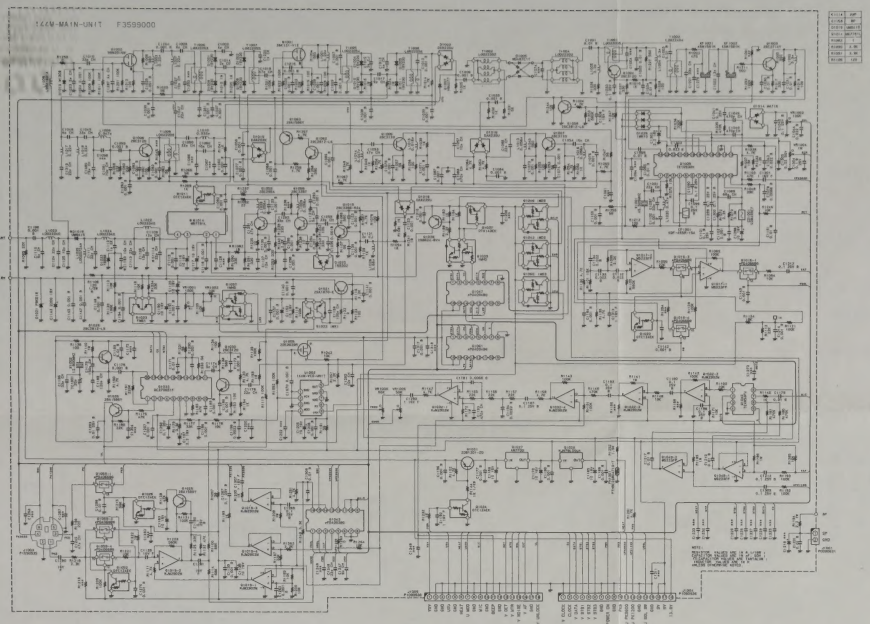


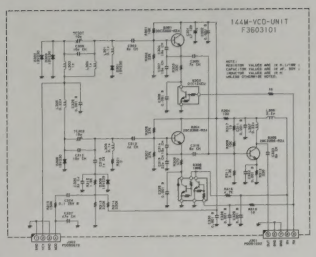


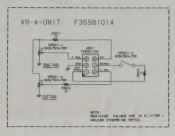


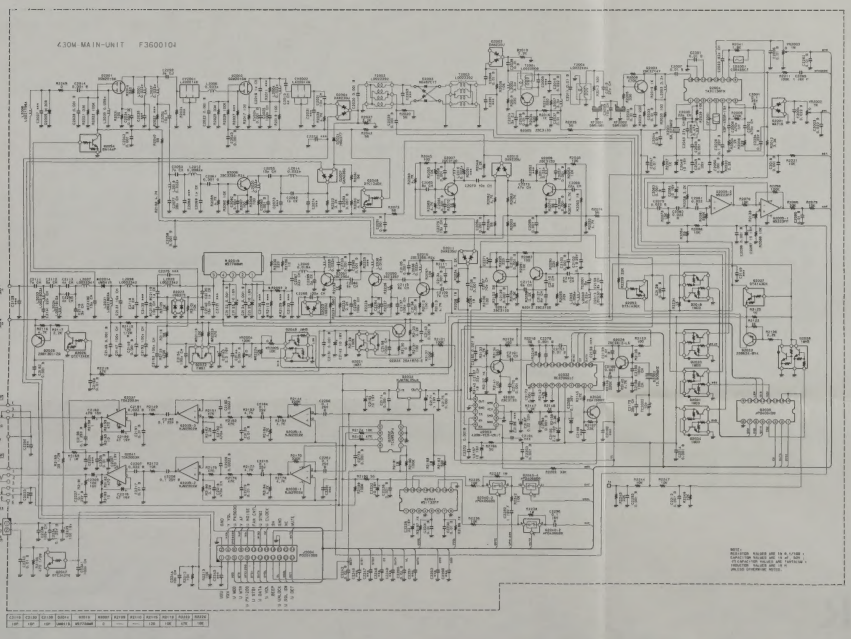


FT-8000R
Circuit Diagram


144M-MAIN-UNIT F3599000


144M-VCO-UNIT
F3603101


VR-A-UNIT F3598101A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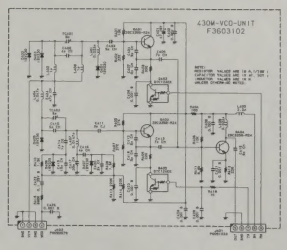
430M-VCO-UNIT
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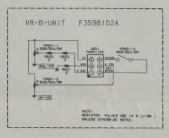
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